

clamp electrically conductive members 74 (FIGS. 7 to 9) of an earthing layer of the cable 4 between the conical member 28 and the sleeve 32 to form an electrical connection between the cable gland 2 and the cable 4.

[0068] A clamping apparatus 38 of a first embodiment of the present invention (the operation of which will be described in greater detail below with reference to FIGS. 3 to 6) is located between a fourth radial surface 40 and a fifth radial surface 42 on the second gland body member 14. The third gland body member 20 contains a ferrule 44 which abuts a sixth radial surface 46 on the third gland body member 20 and a seventh radial surface 48 on the second gland body member 14 abuts an end surface of a resilient seal 50 having an external circumferential groove (52) such that threaded engagement of the second 14 and third 20 gland body members to cause the sixth 46 and seventh 48 radial surfaces to move towards each other compresses the seal 50. The circumferential groove 52 causes the seal 50 to flex radially inwards into sealing engagement with a sheath 54 (FIGS. 6 to 9) of the cable 4.

[0069] Referring to FIGS. 3 to 6, the clamping apparatus 38 and has a plurality of (in the embodiment shown, three) clamping members 56 (FIG. 4) arranged to define an aperture 58 for receiving the cable 4. Each of the clamping members 56 has a first protrusion 60 at a first end 62 thereof for engaging a body of the clamping apparatus 38 in the form of a first body member 64 (FIG. 5) such that rotation of the clamping members 56 relative to the first body member 64 causes the first protrusions 60 to engage respective cam surfaces (not shown) on the first body member 64 to cause the clamping members 56 to pivot relative to actuator means in the form of a second body member 66 such that the first ends 62 of the clamping members 56 pivot inwards to reduce the size of the aperture 58. The first 64 and second 66 body members define respective first and second apertures therethrough for receiving the cable 4.

[0070] Each of the clamping members 56 has a second protrusion 68 at a second end thereof for pivotably engaging respective recesses 70 in second body member 66. In this way, inward or outward pivoting of the clamping members 56 is achieved by rotation of the first body member 64 relative to the second body member 66. Each of the clamping members 56 has a curved clamping surface 72 for engaging conducting sheath 74 (FIG. 7) of the cable 4 to prevent longitudinal movement of the cable 4 relative to the second gland body member 14, while providing an adequate clamping force over a wide range of cable diameters. Each clamping surface 72 has a first surface portion 73 adapted to engage an external surface of a cable of a first diameter and a pair of second surface portions 75 adapted to engage an external surface of a cable of a second diameter, larger than the first diameter. This enables the clamping apparatus 30 to effectively grip cables of a wide variety of diameters while minimising the risk of damage to the cables. The curved clamping surfaces 72 are also provided with protrusions in the form of ribs 76 to improve the clamping force and pull load resistance. First teeth 82 provided on first body member 64 engage corresponding recesses (not shown) on the internal surface of the second gland body member 14, and second teeth 84 provided on the second body member 66 engage corresponding recesses (not shown) on the internal surface of the third gland body member 20. In this way, rotation of the second 14 and third 20 gland body members relative to each other causes rotation of the first 64 and second 66 body

members relative to each other to actuate the clamping apparatus 38 to move the clamping members 56 from an unclamped position to a clamped position.

[0071] The operation of the cable gland 2 will now be described.

[0072] The cable 4 is initially prepared as shown in FIGS. 7 to 9 by removal of part of the sheath 54 to expose the conductive members 74 and individual conductors 80, and the conductive members 74 are splayed outwards as shown in FIG. 7. The splayed conductive members 74 are then located between the conical member 28 and sleeve 32 as shown in FIG. 8, and the conical member 28 and sleeve 32 are brought into engagement with each other as shown in FIG. 9 to establish an electrical connection between the conductive members 74 and the conical member 28 and/or sleeve 32. The first 6 gland body member is then brought into threaded engagement with the second gland body member 14. At this time, the second 14 and third 20 gland body members are in loosely threaded engagement with each other so that the seal 50 is uncompressed or is only lightly compressed, and the clamping apparatus 38 is in its unclamped position as shown in FIG. 3.

[0073] The second 14 and third 20 gland body members are then brought into tighter threaded engagement with each other to cause the first 64 and second 66 body members of the clamping apparatus 38 to be rotated relative to each other to bring the curved clamping surfaces 72 of the clamping members 56 into engagement with the external surface of the sheath 54 of the cable 4, as shown in FIGS. 5 and 6 to firmly clamp the cable 4 in position. Tighter engagement of the second 14 and third 20 gland body members also causes the seal 50 to be compressed and urged radially inwards into sealing engagement with the sheath 54 of the cable 4.

[0074] A clamping apparatus 38 of a second embodiment of the present invention is shown in FIG. 10. In the clamping apparatus 38 of FIG. 10, the ribs 76 of the embodiment of FIGS. 3 to 6 are replaced by electrically conductive spikes 86 which penetrate the sheath 54 of the cable 4 as the clamping apparatus 38 is brought into its clamping condition, so that an electrical connection is formed between the electrically conductive members 74 of the earthing layer of the cable 4 and the electrically conductive spikes 86, without the necessity of removing the sheath 54 of the cable 4 to expose the electrically conductive members 74, as is shown in FIG. 13. Alternatively, or in addition, the clamping apparatus 38 can be provided with ribs 76 as shown in FIG. 4 for forming an electrical connection with conductive members 74, as shown in FIGS. 11 and 12. In this way, the clamping apparatus 38 provides an earthing connection between the cable gland 2 and the cable 4 and pullout resistance at the same time, as a result of which the conical member 28 and sleeve 32 of the embodiment of FIGS. 1 to 9 are no longer necessary. This simplifies the construction of the cable gland 2 embodying the arrangement of FIG. 10, but also simplifies the assembly of the cable gland 2 to the cable 4, since the conductive members 74 do not need to be splayed outwards, and the cable gland 2 can be directly mounted to the cable 4 as shown in the arrangement of FIG. 12. A cable gland 2 incorporating the clamping apparatus 38 of FIG. 10 is shown in FIG. 15.

[0075] A second embodiment of a cable gland 90 of the present invention is shown in FIG. 14. The cable gland 90 includes a first clamping apparatus 38 as shown in FIGS. 4 to 6 for clamping the external surface of a cable 4 and a